Evaluation of Cr(III) by ion-exchange resins from aqueous solution: equilibrium, thermodynamics and kinetics

Serpil Edebali*, Erol Pehlivan

Department of Chemical Engineering, Selcuk University, Campus, 42079 Konya, Turkey
Tel. +90 332 2232088; Fax: +90 332 2410635; email: serpilcetin@gmail.com

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ABSTRACT

The removal of Cr(III) ions from aqueous solution by two commercially available resins (Amberlite IRN77 and Purolite C160) was investigated. Batch adsorption processes were carried out as a function of time, adsorbent dosage, pH, concentration and temperature to evaluate the performance of the resins. It was found that more than 90% removal was achieved under optimal conditions. The optimum pH for Cr(III) adsorption was found as 4.0 for these resins. The suitability of Freundlich, Langmuir, Scatchard and Dubinin–Radushkevich adsorption models was also investigated for Cr(III)-resin system. A pseudo-second-order kinetic model has been proposed to correlate the experimental data. The equilibrium adsorption level for Amberlite IRN77 slightly decreased with increasing temperature, while it was nearly the same for Purolite C160.

Keywords: Trivalent chromium; Ion exchange resin; Equilibrium; Thermodynamics; Kinetics

*Corresponding author.